



Powering Progress in Combined Heat and Power (CHP)

For Now . . .
For the Future

What Is Combined Heat & Power?

CHP is an integrated set of technologies for the simultaneous, on-site production of electricity and useful heat.

The hallmark of CHP is exceptional energy efficiency. This is achieved by making use of the heat produced during power generation and avoiding the losses from transmission over the grid.

Today, CHP offers an economical way to achieve multiple national goals:

- Save energy (more than 1.8% of annual U.S. energy use)
- Reduce CO₂ emissions (248 million metric tons annually)
- Boost competitiveness, job creation, and energy security

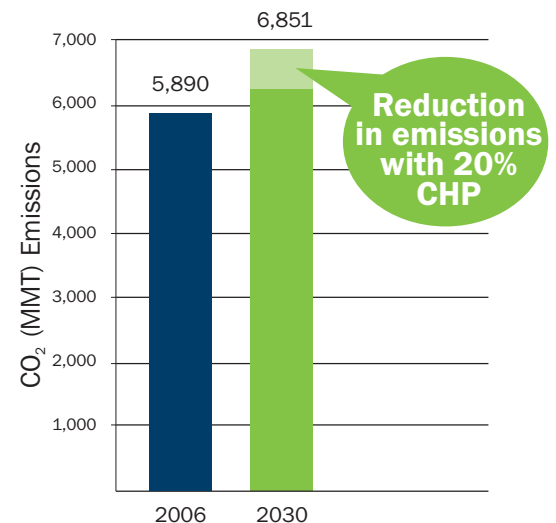
The U.S. Department of Energy (DOE) and its partners provide the technology advances and technical assistance necessary to increase the use of Combined Heat and Power (CHP) across America. CHP provides efficient, clean, reliable, and affordable energy for today and the future.

Nations around the globe seek to prevent greenhouse gas (GHG) emissions from rising with projected increases in energy demand. CHP is an affordable option to reduce energy intensity, stimulate competitiveness, and curtail carbon emissions.

DOE's technology advances and market transformation efforts have already helped to establish CHP in many large industrial applications. Continuing efforts to improve CHP reliability, efficiency, and cost effectiveness are opening new opportunities in smaller industrial applications, commercial buildings, and elsewhere.

If CHP were to supply 20% of U.S. electricity generating capacity by 2030, the projected increases in CO₂ emissions would be cut by 60%.

CHP Can Avoid 60% of the Potential Growth in GHG Emissions Between 2006 and 2030



Source: DOE AEO, 2008



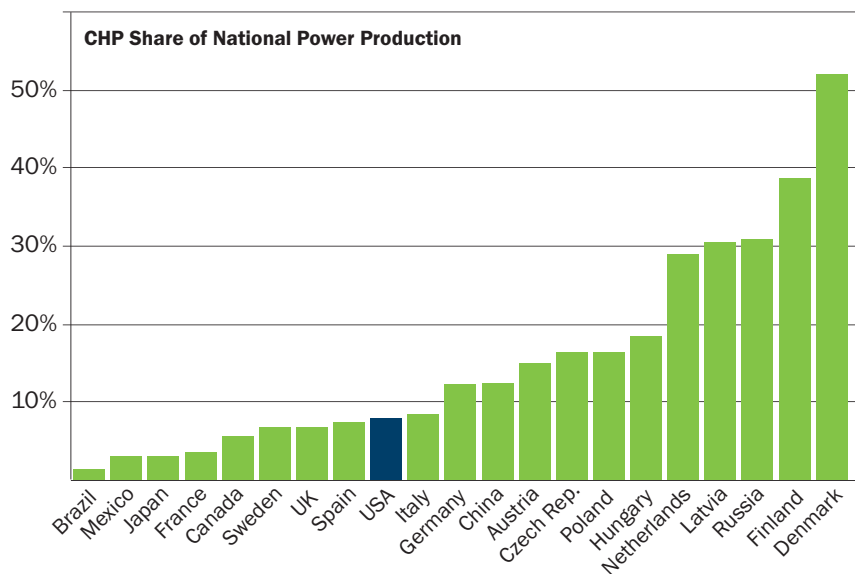
U.S. Department of Energy
Energy Efficiency
and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable



DOE's Leading Roles

The Industrial Technologies Program (ITP) within DOE is leading technical innovation and spurring the deployment of CHP technology through an industry partnership to support **technology R&D** and **market transformation**.



The United States Lags Other Nations in CHP Usage Relative to Total Power Capacity

CHP already produces more than 20% of the electricity in some European nations. Their climates, building densities, and energy policies support this high level of CHP penetration. While America cannot replicate these conditions, much can be done to overcome the barriers that now limit the adoption of CHP.



DOE Supports Technology R&D

New and improved CHP technologies are needed to expand current markets and open new opportunities. ITP research teams are working to achieve the following:

- Maximize CHP energy efficiency.
- Increase CHP fuel flexibility.
- Capture additional waste streams.
- Expand the variety of applications.

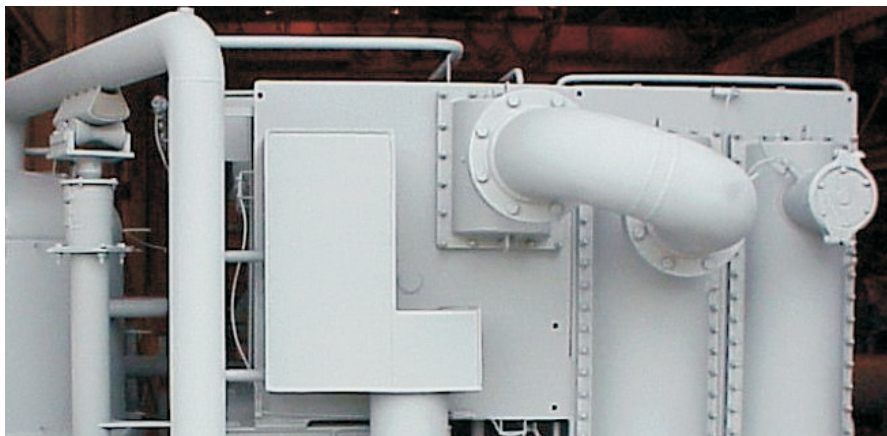
ITP's technology R&D program for CHP focuses on two main areas:

- **Component Technologies** that improve efficiency, lower emissions, and facilitate new applications for advanced turbines, advanced reciprocating engine systems, microturbines, and thermally activated technologies
- **Integrated Energy Systems** with "plug and play" capability for new markets at commercial and small industrial facilities

DOE Market Transformation

ITP works with diverse partners to remove market or institutional barriers and achieve wider adoption of CHP systems. Special attention is focused on high-growth markets such as commercial and institutional buildings. Activities emphasize achievement of the following objectives:

- Provide local technical assistance and educational support through the CHP Regional Application Centers (RACs).
- Promote CHP and its benefits through ITP's successful Save Energy Now outreach and education initiative.
- Leverage partnerships with other federal agencies, states, utilities, and others to conduct technology demonstrations.



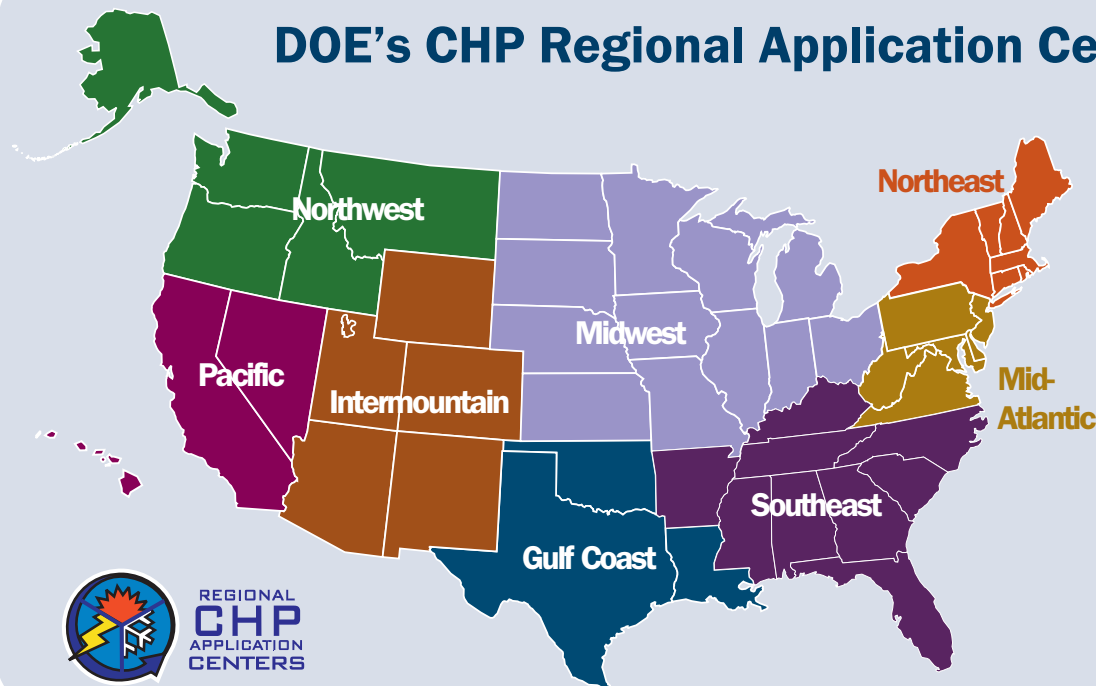
CHP Provides Resiliency

When Hurricane Katrina struck in 2005, the Mississippi Baptist Medical Center in Jackson, MS, remained open and operational despite the loss of grid power for several days. The hospital's gas turbine CHP system provided electricity, hot water, and cooling service—beyond what could be provided by its backup generators alone.

The hospital provided emergency food and shelter on the first night of the disaster and continued to serve as the only functional hospital in the Jackson Metro Area.



DOE's CHP Regional Application Centers (RACs)



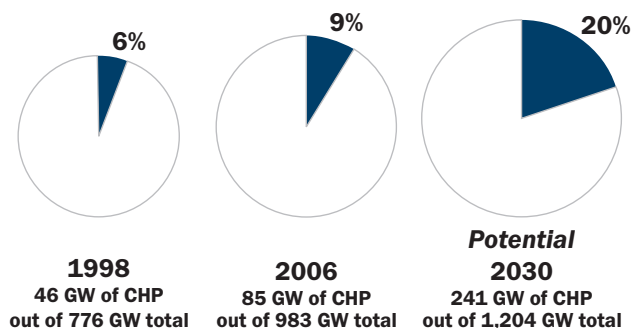
Since their inception in 2001, the eight RACs have successfully delivered:

- More than 120 CHP workshops in all sectors
- Training and site-specific technical support for more than 350 CHP projects
- 7 million metric tons of avoided CO₂ emissions



CHP Opportunities

Through continued R&D and outreach, DOE and its partners can help to dramatically increase the CHP share of U.S. electricity generating capacity. A recent study by a national laboratory found that significant benefits would accrue by raising the CHP share to 20%.



Benefits of CHP Growth

	2006	2030
	85 GW	241 GW
Annual Energy Savings	1,895 trillion Btu/yr	5,272 trillion Btu/yr
Total Annual CO₂ Reduction	248 MMT	848 MMT
Cars Taken Off Road (Equivalent)	45 million	154 million

Source: EEA, ORNL, DOE, AEO, 2008



CHP Provides a Profitable Path to "Going Green"

Hospitals, universities, and manufacturers have installed hundreds of CHP systems because they offer a cost-effective way to meet their energy requirements. As more businesses and institutions take steps to "green" their campuses, they find that CHP technology is not only more affordable than other options—it provides a *net cost savings*.

Did you know?

- CHP can convert more than 80% of the energy in fuel into useful power and heat. That's nearly twice the efficiency of conventional electricity and steam production.
- CHP systems can use waste or byproduct fuels (e.g., landfill gas), providing even greater energy benefits.
- CHP users can adapt quickly to increased demand— independent of utility expansion projects.

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America.

Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.

For more information contact:

EERE Information Center
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